

Designing for All: A Study of Universal Design at Ball State University

An Honors Thesis (HONRS 499)

by

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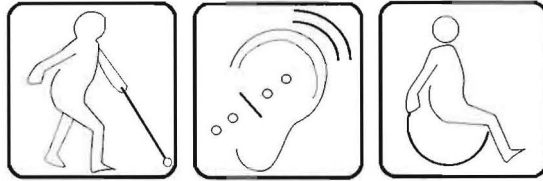
A handwritten signature in cursive script that reads "Carol A. Brown".

Ball State University  
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**[ACCESSIBILITY REDEFINED]**

## TABLE OF CONTENTS

Abstract & Acknowledgements	3
Understanding Disability	5
Defining Accessible Design & Other Key Terms	6
Introduction to Universal Design	8
7 Principles of Universal Design	10
Universal Design in Higher Education	12
Project Description	14
SDS Survey Results	16
References	20
Appendix	21



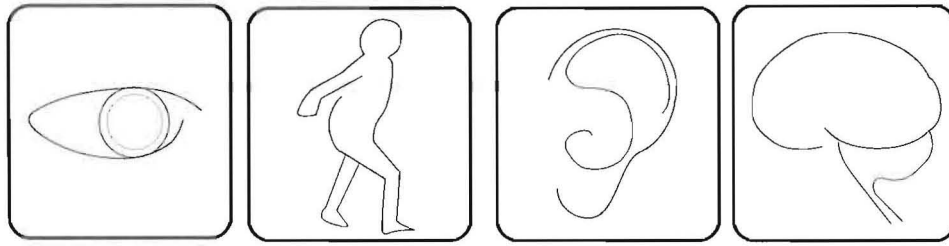
## ABSTRACT

Universal Design is a principle that is currently becoming more popular in the design community. In the 1970's, the term "universal design" was coined by architect Ronald Mace, who defined universal design as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Burgstahler & Cory, 2008). It simply promotes good design that is accessible to the widest range of users, focusing on promoting equality in the built environment. As students of Interior Design and Architecture (respectively), we wanted to research more about this topic and use our findings and observations of the built environment to assess the campus and buildings of Ball State University. Currently, there are no accessibility guides or maps available to those students who use the services of Ball State's Disabled Student Development (DSD). Thus, we have put together a clear and concise guide for each academic building on campus. Each guide consists of a picture of one of the building's entrances, a description of certain building attributes that might influence accessibility, and a floor plan that uses easy-to-read symbols that show locations of accessible entrances, elevators, and accessible restrooms. We hope that this will make it easier for all students--not just those who may have disabilities --to adjust to life at BSU, making it easier for them to get around campus. Through this inventory, we have discovered that some buildings are more friendly to disabled students than others. This research paper may also serve as a type of design guide to students of Interior Design, Architecture, Landscape Architecture, and Urban Planning. The ultimate goal of this thesis project is to inform not only design students but everyone of the importance of universal design and promote its implementation in the design and construction of the built environment.

## ACKNOWLEDGEMENTS

First of all, we would like to thank our Thesis Advisor, Carol Brown, for all of her input and guidance along the way. Larry Markle, director of Disabled Student Development, and his past graduate assistant provided valuable information, which helped us begin this project. We would like to thank all of those students who participated in our survey, as well. Finally, a special thanks goes to Janet Fick and Dan Stephenson for providing us with floor plans.





## UNDERSTANDING DISABILITY

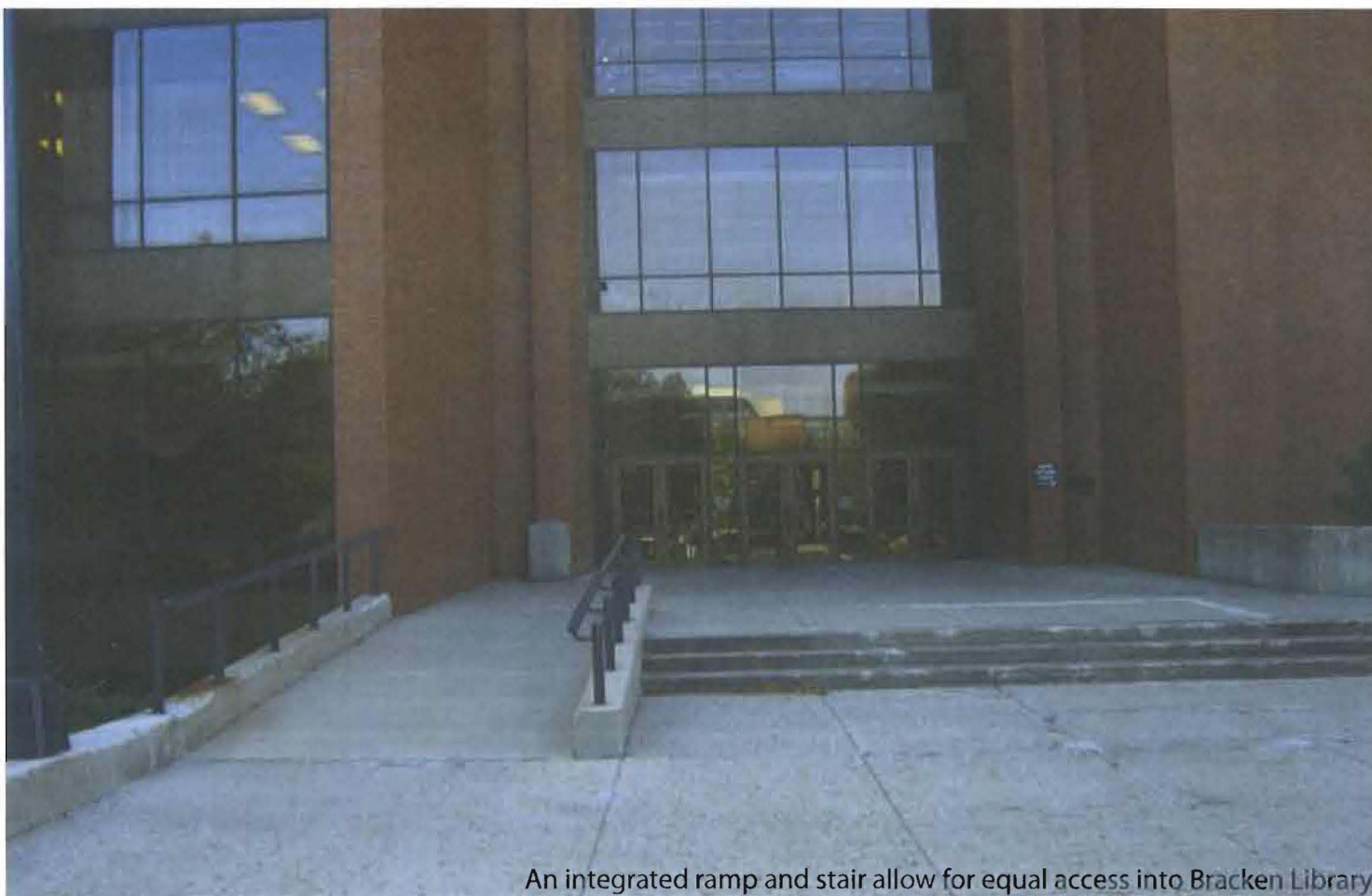
Some people are born with disabilities, while others develop them later on in life. According to the Americans with Disabilities Act (ADA), a person has a disability if he/she: "(1) has a physical or mental impairment that substantially limits one or more major life activities of such individual (including walking, seeing, hearing, speaking, breathing, learning, working), (2) has a record of such impairment, or (3) is regarded as having such an impairment" (Burgstahler & Cory, 2008, p. 11). Worldwide, approximately 550 million people are disabled. In the U.S., the number of disabled persons is 54 million (Jaeger & Bowman, 2005, p. vix), which means that one in five Americans has a disability – either in mobility, vision, hearing, learning, or function (Harrigan & Clokey, 1994). Impaired mobility or dexterity is the most common form of disability; over 9 million Americans use mobility aids. Approximately 8 million Americans suffer from visual impairments, while over 22 million have hearing impairments. As birth rates and life expectancies increase, so does the number of people with disabilities (Dobkin & Peterson, 1999, p. 5). As we age, our bodies undergo changes and may not be as mobile as in childhood. In fact, roughly 85% of the disabled population worldwide developed their disabilities later on in life as they aged (Jaeger & Bowman, 2005, p. vix). As stated in the film Introduction to Universal Design (1994), despite the great disabled population, there is a stigma associated with disability. Since we are a nation that embraces diversity, then shouldn't we better address accessibility in the built environment and accommodate those who may have disabilities?

## DEFINING ACCESSIBLE DESIGN & OTHER KEY TERMS

Those who are disabled often face challenges in the built environment, although there are building codes that specify minimum requirements for access. Access is a term that applies to a variety of settings (i.e. buildings, transportation, communication, and public environments) and entails providing every user with the opportunity to participate in life without restrictions or limitations. Architects, landscape architects, and interior designers most commonly address physical access to and within buildings. This involves the physical act of entering and navigating a building and being able to reach the things within (Jaegar & Bowman, 2005, p. 63).

Designers need to keep in mind the needs of all users, including those with disabilities. Accessible design is design of the physical environment that is barrier-free. Laws, public policies, and design standards commonly stipulate minimum accessibility requirements. The Americans with Disabilities Act of 1990 (ADA), for instance, has increased public awareness of accessibility by establishing guidelines that designers must follow to eliminate physical barriers (Burgstahler & Cory, 2008, p. 9). The Individuals with Disabilities Education Act guarantees students access to public education. Under this law, students must be able to physically enter the school, access what's inside, and be fully accommodated by the least restrictive environment (Jaegar & Bowman, 2005, p. 64).





An integrated ramp and stair allow for equal access into Bracken Library

There are two other concepts that are related to accessible design: usable design and accommodation. Usable design refers to “usability,” or “the extent of which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (Burgstahler & Cory, 2008, p. 11). In other words, how easy is it for someone to learn how to use a product, use it efficiently and effortlessly, and remember how to use it in the future? Accommodation, on the other hand, means providing an adjustment or modification to make an environment or product accessible to a disabled person. It is a reactive approach to design, which means that it is something extra that has to be added to the design after it has already been built (Burgstahler & Cory, 2008, p. 11).

A disabled person may be able to enter a building, but what if he/she does not have access to the things inside? Unfortunately, the “accessible routes” in a building are most often not integrated within the building as a whole, forcing physically disabled persons to use a route different from the route that a non-disabled person would take. These “other” routes are often much more indirect, inefficient, and difficult (Jaegar & Bowman, 2005, 63). Jaegar and Bowman (2005) advise designers to ask themselves not whether or not the building is accessible, but whether or not their design is logical, practical, and optimal. Thus, designers should go above and beyond the minimum requirements and design fully accessible and inclusive spaces. As defined by Jaegar and Bowman, something is truly accessible if it produces similar results for everyone and can be experienced with a number of senses in numerous ways. Accessibility makes information and services available to everyone, including those with disabilities (Jaegar & Bowman, 2005, p. 70). Designers can create effective spaces only if they truly understand everyone’s needs.



## INTRODUCTION TO UNIVERSAL DESIGN

“Universal design” is a phrase that is becoming very popular in the design field today. As a social movement, it focuses on the design of environments, products, and communication systems that are usable by the widest range of people (Irmie & Hall, 2001, p. 14). In the 1970’s, the term “universal design” was coined by architect Ronald Mace, who defined universal design as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Burgstahler & Cory, 2008, p. 6). According to Dobkin and Peterson (1999), we know universal design as “the inclusive and non-discriminatory design of products, cars, architecture, and urban environments and infrastructures.” This approach to design creates environments that meet the needs of the broadest range of people. It is simply good design – design that accommodates everyone in all stages of their lives (Aging & Disabilities Services, 2006).

The universal design process focuses on the user’s perspective and preferences. The environment must respond to the widest range of bodily shapes, sizes, and movements. Since people’s abilities change throughout their life, the design of buildings and products should accommodate this change (Irmie & Hall, 2001, p. 15). The idea of adaptability and flexibility is also inherent in the universal design concept; environments should be easily adjusted to meet the needs of any user (Irmie & Hall, 2001, p. 16). Thus, universally designed environments and products benefit a diverse group of users by being adjustable according to their needs and preferences. This makes settings and places inclusive (Burgstahler & Cory, 2008, p. 7).



Some practices of universal design include providing ample clearances for doors, making doorways wide enough, and eliminating the presence of steps up to an entry. Successful environments engage all of the senses, including physical, sensory, and cognitive (Aging & Disabilities Services, 2006). Curb cuts are a perfect example, too. They accommodate those in wheelchairs, those who are pushing baby strollers, those who find it difficult to walk, and those who are delivering goods on a cart (Burgstahler & Cory, 2008, p. 6).

Our current environments are unsuccessful and should be designed and built with universal design principals in mind. In fact, U.D. should be the standard for design and construction rather than the exception. According to Greer, "improved design standards, better information, and new products and lower costs make it possible for design professionals to begin designing all buildings interiors and products to be usable by all people all of the time instead of responding only to the minimal demands of law that requires a few special features for disabled people." Additive design, or simply adding a design element to only compensate those who have a disability, should be avoided because it is not integrative and often calls attention to a person's disability (Irmie & Hall, 2001, p. 14). By making environments and products accessible and usable from the start, U.D. aims to "de-stigmatize" (Burgstahler & Cory, 2008) disability in order to reach a more inclusive world where everyone feels comfortable and safe. Since it is impossible to meet the needs of every single possible user in all instances, the goal of U.D. is to meet the needs of people who have a wide range of abilities and provide compatibility through assisting technologies when necessary (Burgstahler & Cory, 2008, p. 11).

## UNIVERSAL DESIGN PRINCIPLES

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These can be applied to all aspects of design: the built environment, product design, and outdoor spaces.

### EQUITABLE USE

The design is useful and marketable to people with diverse abilities.

*Ex: Designing a ramp for the entry to a building instead of stairs.*

### FLEXIBILITY IN USE

The design accommodates a wide range of individual preferences and abilities.

*Ex. Designing scissors that work for right- or left-handed users.*

### SIMPLE & INTUITIVE USE

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

*Ex. Specifying a moving sidewalk in a public space.*

### PERCEPTIBLE INFORMATION

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

*Ex. Tactile, visual, and audible instructions on a thermostat.*

### TOLERANCE FOR ERROR

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

*Ex. Ctrl + Z to undo a mistake on a computer.*

### LOW PHYSICAL EFFORT

The design can be used efficiently and comfortably and with a minimum of fatigue.

*Ex. Lever or loop handles on doors and faucets*

### SIZE & SPACE FOR APPROACH & USE

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

*Ex. Front-facing controls on appliances with clear floor space for access*



# GUIDELINES

## EQUITABLE USE

- 1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
- 1b. Avoid segregating or stigmatizing any users.
- 1c. Provisions for privacy, security, and safety should be equally available to all users.
- 1d. Make the design appealing to all users.

## FLEXIBILITY IN USE

- 2a. Provide choice in methods of use.
- 2b. Accommodate right- or left-handed access and use.
- 2c. Facilitate the user's accuracy and precision.
- 2d. Provide adaptability to the user's pace.

## SIMPLE & INTUITIVE USE

- 3a. Eliminate unnecessary complexity.
- 3b. Be consistent with user expectations and intuition.
- 3c. Accommodate a wide range of literacy and language skills.
- 3d. Arrange information consistent with its importance.
- 3e. Provide effective prompting and feedback during & after task completion.

## PERCEPTIBLE INFORMATION

- 4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
- 4b. Provide adequate contrast between essential information & its surroundings.
- 4c. Maximize "legibility" of essential information.
- 4d. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
- 4e. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

## TOLERANCE FOR ERROR

- 5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- 5b. Provide warnings of hazards and errors.
- 5c. Provide fail safe features.
- 5d. Discourage unconscious action in tasks that require vigilance.

## LOW PHYSICAL EFFORT

- 6a. Allow user to maintain a neutral body position.
- 6b. Use reasonable operating forces.
- 6c. Minimize repetitive actions.
- 6d. Minimize sustained physical effort.

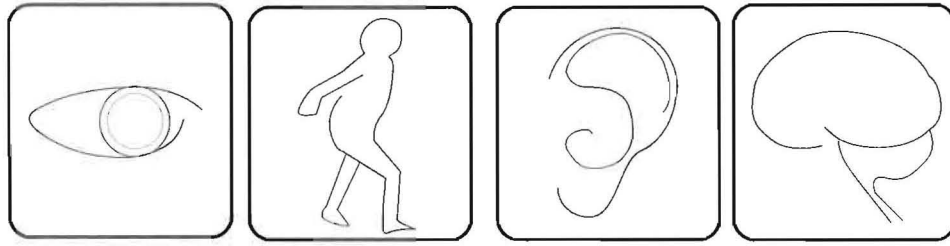
## SIZE & SPACE FOR APPROACH & USE

- 7a. Provide a clear line of sight to important elements for any seated or standing user.
- 7b. Make reach to all components comfortable for any seated or standing user.
- 7c. Accommodate variations in hand and grip size.
- 7d. Provide adequate space for the use of assistive devices or personal assistance.



As Ball State is making its campus more green, it should also look towards making it equally accessible.





## UNIVERSAL DESIGN IN HIGHER EDUCATION

Of course, we all differ in our physical, visual, hearing, learning, attention, and communication abilities. It is estimated that 6% or more of college students have some sort of disability with the majority of disabilities being “invisible,” such as learning disabilities (Burgstahler & Cory, 2008, p. 4). Universal Design in Higher Education (UDHE) promotes equality, social integration, community, and accessibility by creating environments and products for a wide range of people. As university and college communities become more and more diverse (in gender, race, ethnicity, age, ability/disability, and learning style), the concept of UD is applied to a number of fields, including physical places, web sites, and student services (Burgstahler & Cory, 2008, p. 3). Effective campus master plans should reflect the university’s mission and goals. The principles of universal design can help universities during their planning phases to connect academic, strategic, and campus planning. The ultimate goal should be environmentally responsible design that addresses human needs and behavior, diversity, efficiency, adaptability, and usability among other concerns (Dobkin & Peterson, 1999, p. 159).

## PROJECT DESCRIPTION

This project is about applying our understanding of universal design to Ball State's Campus. When we embarked on this project, we first contacted the Disabled Student Development. The Director, Larry Markle, got us acquainted with this service and gave us some valuable information (see attached Appendix). We gained valuable feedback from students who actually use DSD through an electronic survey that we sent out at the beginning of the semester. The survey results follow. We also thought it would be valuable to research other universities and their accessibility maps and other material (see attached Appendix).

The next step was to visit the buildings on Ball State's campus and critically examine and assess the accessibility of these places. We focused on the major academic buildings and excluded dormitories. The three aspects with which we were most concerned were: accessibility of entries, location of public elevators, and location and accessibility of restrooms. These are noted on the campus accessibility maps (included as a separate document). Important notes regarding the general accessibility of these places are also included, along with a picture of a typical entrance and a location map.

We hope that this project will allow all students -- not just those who are disabled -- to get better acquainted with campus. We think this will be particularly helpful for new students who are not as familiar with campus. As Ball State continues to expand, we hope that it will continue to promote equality by integrating universal design principles in its built environment.

We also created a Universal Design Principles Checklist sheet (included as a separate document) to educate Ball State's design students on the concept of Universal Design. In order to change the future of the way buildings and public spaces are designed, students must be introduced to the topic now. We plan to pass these out in the College of Architecture and Planning and the Interior Design department.



The majority of Ball State's campus is accessible.



The David Letterman Building is one of the most accessible buildings on campus.



## DSD SURVEY RESULTS

This survey was created using an online source and sent to Ball State's Disabled Student Development email list. We received responses from nine individuals who participated anonymously. Responses were reported between September 17th and September 22nd, 2009.

### 1. When you were an incoming student, did you feel that Disabled Student Services provided you with adequate information on campus accessibility? (Yes or No)

Yes 100%

No 0%

### 2. How could your incoming student experience have been improved? What kind of information would you have liked to have, etc.? (Short Answer)

- When I first got here they gave me my key for my room and a white card. I didn't know that card opened the doors, no one told me till I asked how I could get into my room. So maybe tell them before that they will get the card and explain what it is.
- locating restrooms for those who are visually impaired and have a mobility impairment.
- my experience was great. Nothing could have made it better.
- I would've liked to see more campus maps telling me I was going for the first week.
- nothing else
- Nothing - the wonderful DSD department is the primary reason why I am at this school and all of their services were well detailed to me on visits, etc.
- tours provided by other students with disabilities
- Nothing really, I feel that my experience was the best possible.
- Where the accessible entrances are located. What dorms are accessible. Which dinning halls are easier to get around in. (especially for wheelchairs)

3. Would a campus accessibility map be helpful? (Notes location of accessible restrooms, entrances, parking, etc). (Yes or No)

Yes 66.7%

No 33.3%

4. Did Ball State's reputation as an accessible campus influence your college decision? (Multiple Choice)

Yes, it was one of my main reasons for coming here 77.8%

Yes, but I came for other reasons, such as an academic program 22.2%

No, but I appreciate the measures taken by the university 0.00%

No, not at all 0.00%

5. Are there any campus buildings that are particularly simple for you to navigate? Why are they better than the other buildings? (Short Answer)

- Noyer is really easy to get in to because of the cards we get. cooper and robert bell are also easy all the buttons are easy to get to and the classes are easy to find.
- RB is simple to navigate because the hallways are wide and each floor is the same layout when trying to find room numbers.
- Bracken Library, because it has wide halls, big elevators, and tables not too high or too low.
- RB and Burkheart because they are mainly one level. Things are clearly labeled.
- the new buildings except park hall
- Noyer is by far the most chair-friendly.
- AJ is probably most compliant with ADA standards
- Most all of them are simple to navigate.
- The letterman building is laid out well. The elevator is very visible, the ramps are at a good incline and the hallways are nice and wide. The arts and journalism building is the same way.



## 6. Which campus buildings are the hardest to navigate? Why? (Short Answer)

- Lafollette's lift is difficult to work so it's more difficult to get around there.
- North Quad is the hardest building to navigate because the building is in 3 separate parts with stairs connecting each part. The elevators are located in out of the way places, making them difficult to find. Braille room numbers would make finding rooms much easier.
- North Quad, because the elevators are small, only one way to get to rooms.
- North Quad and Copper. North Quad is on split levels. Copper has the three sections. You can go up the elevator on one side and be opposite of where you need to be.
- Robert Bell because the elevator is soooooo slow. Bracken library because there are no wheelchair stalls in the restrooms.
- The layout of North Quad is just terrible. Also, though the department is aware of it and willing to accommodate it as much as possible, some of the spaces in the theatre department building (AC) are not that easy to get around, and THEY SHOULD REALLY BE GIVEN A NEW BUILDING!
- North Quad, due to the combination of buildings, it is often required to go down a level on the service elevator then up a difficult ramp only to enter another elevator
- North Quad, because you have to take like three elevators to get where you want.
- North Quad. The floors are not all level and you have to sometimes take different elevators to get to where you would like to go.

## 7. If there were a guide for incoming students, what advice would you include for those who may wish to use Disabled Student Services? (Short Answer)

- I don't know. I would tell them to use them because it's a lot of help.
- Be sure to ask for notetakers at the beginning of the semester.
- Always, Always, Always speak up if you need help.

- Learn to be your own self advocate. Learn the layout of the buildings before you schedule your classes, for example LaFoutte.
- live in noyer because everyone else does.
- I would say that they need to advocate for themselves - DSD is great about helping students who ask for it but cannot help anyone if they are not also helping themselves and making sure their needs are known.
- to make an appointment at the start of the semester so that they may get to know the staff and the location of the office.
- Leave every bit of help people offer open to your approval never say no because you might find out it would be helpful in the future.
- Make sure they make DSD aware of thier needs. They also need to get aquianted with the staff.

#### 8. What advice would you give architecture and interior design students for them to best meet your needs in the built environment? (Short Answer)

- Maybe more outlets, because I have a lot of stuff I have to leave plugged in because i can't reach them to unplug stuff and switch it for something else. Maybe lower desks if possible.
- The curb cuts should be painted. They are difficult for students to find who are in a wheelchair and have a visual impairment.
- just get people to comment about how people will use the building.
- Put in easy to read directories. Make handicapped buttons easier to reach. Put in wheelchair friendly elevators.
- do not put wheelchair accessible dorm rooms at the end of the hall
- I would tell them to rent out a wheelchair, put themselves in it and actually spend some time going around in it to get used to how we get around, as that would give them more perspective on how things need to be designed if they experience things from our vantage point.
- Don't just build to code. Build for people... ADA has been helpful but it is not all inclusive, nor is it always practical for real life situations. If your building 1' for 12' but can create switchbacks or even if you can eliminate the need for ramps altogether do so. Also put signage in braile in more convient places. Keep in mind that most wheelchair users are short. Use levers rather than knobs on doors and try to make the doors lighter and easier to open as automatic door openers break frequently. Please put wheelchair friendly desks in all rooms so that the student or faculty isn't required to beg, steal or borrow from other rooms.
- None
- Try to make the important things on the floor as much as possible. If not make sure someone in a chair can still get to it. Make sure the ramps are not too steep.

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\*Note: All floor plans that appear in Campus Accessibility Map were obtained from BSU Facilities Department.

## APPENDIX

### Ball State University Sources:

Attendant Care Information Packet

Current DSD Guide for Students

Accessibility Notes for Campus Buildings (done by Larry Markle's Graduate Assistant)

### Outside Sources:

Department of Facilities Management at Brown University: Accessibility Map

University of California, Berkeley: Parking & Building Entrances

Campus Map

Handbook for New Students with Disabilities



**[ACCESSIBILITY REDEFINED]**

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The design is useful and marketable to people with diverse abilities.

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